

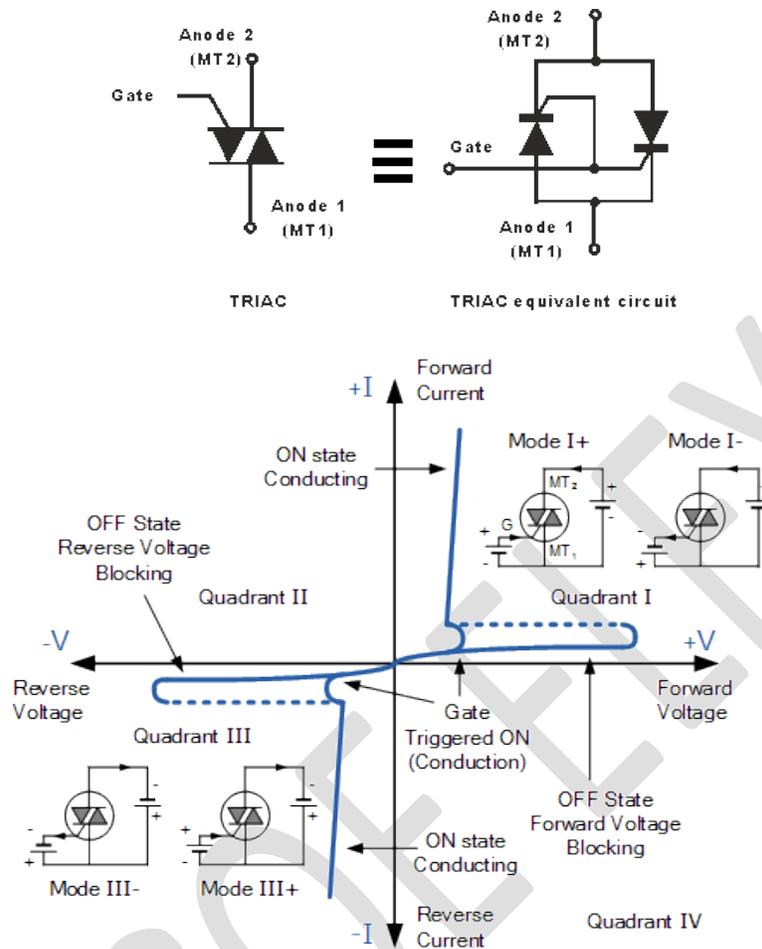
EXPERIMENT 14: TRIAC CHARACTERISTICS

AIM: To study and plot the V-I characteristics of TRIAC

APPARATUS: D C Power Supply (0-128 V), (0-32V), Voltmeter (0-100V), TRIAC BT136, Digital multimeter, Ammeters (0-100mA, 0-25mA, 0-1mA), Resistors 1K,10W & 1K,1W.

THEORY:

Thyristor Characteristics: - The TRIAC is a three terminal, four layer semiconductor device for controlling current. It gains its name from the term **TRI**ode for **Alternating Current**. Its three terminals are MT1, MT2 and the gate (G). TRIAC is the most widely used member of the thyristor family. It is basically a combination of two SCRs connected in antiparallel configuration within the same chip. Unlike SCRs, it is a bidirectional device, and can be triggered either by positive or negative gate signal. Because of its bidirectional conduction property, TRIAC is widely used in the field of Power electronics for control purposes. TRIAC BT136 is the most widely used in the fan regulator. Like and SCR, a TRIAC also starts conducting only when the break over voltage is reached. Earlier to that the leakage current which is very small in magnitude, flows through the device and therefore it remains in the OFF state. The first quadrant characteristic is just like an SCR, but in the third quadrant characteristics of a TRIAC is identical to its first quadrant, except that, as the polarities of the main terminals change, the direction of current changes. MT2 is positive with respect to MT1 in the first quadrant and if is negative it is negative in the quadrant. The device when starts conducting allows very heavy amount of current to flow through it. This high inrush of current must be limited by using external resistance, or it may otherwise damage the device. The gate is the control terminal of the device. By applying proper signal at the gate, the firing angle of the device can be changed thus, the phase control process can be achieved. Its main limitation as comparison to SCRs is, its low power handling capacity.



PROCEDURE:

A. Forward Blocking State / OFF state

- 1) Connect the circuit as shown in the figure.
- 2) Keep TRIAC gate open.
- 3) Vary the voltage between MT2 & MT1 by changing supply V2.
- 4) To find the leakage current, keep gate open and increase voltage V2 to firing value. A small magnitude of current will flow through the device which is called leakage current. (I_L).
- 5) Note down the voltage & current and find out the drop across TRIAC $V_{(MT2-MT1)}$.

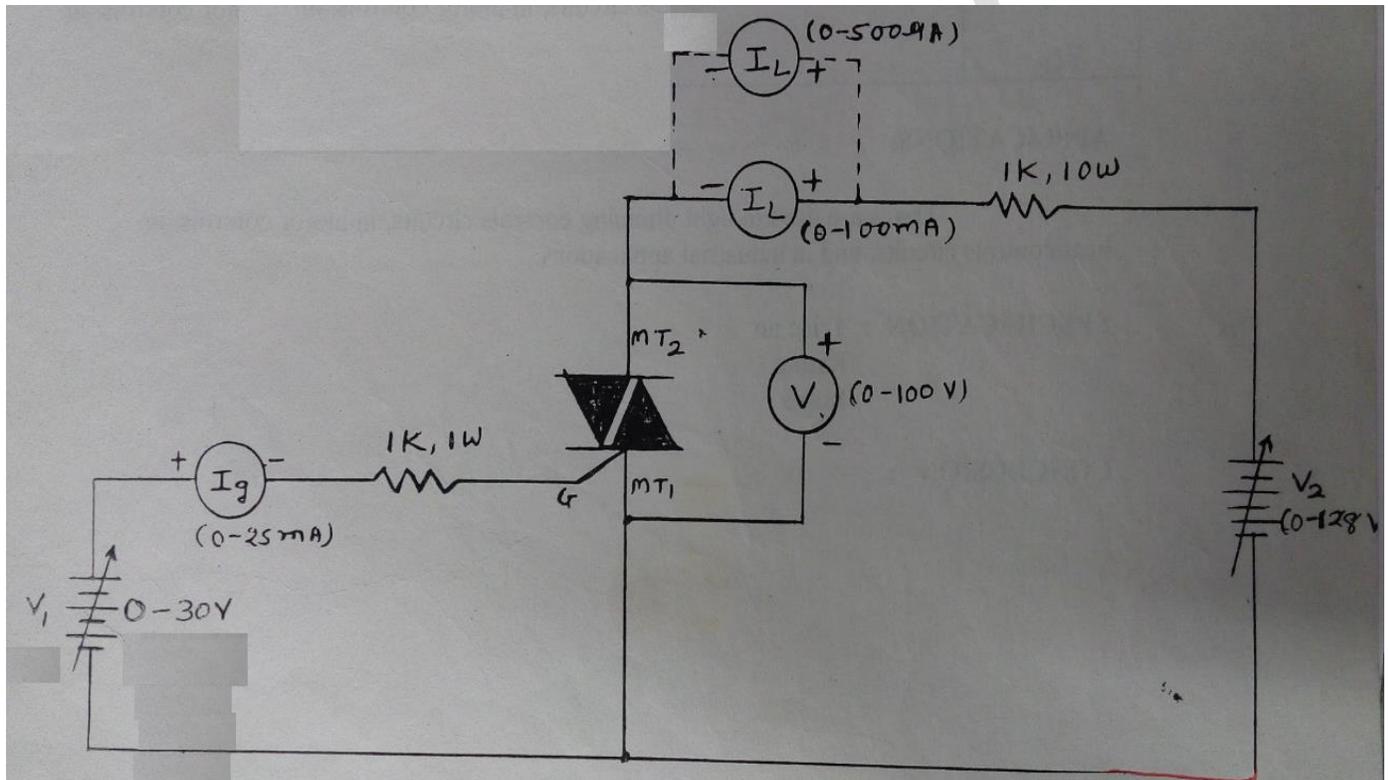
B. Forward Conducting State / ON State

- 6) Connect the gate of the TRIAC to supply V1.
- 7) Adjust gate current by changing V1 and find out the firing voltage of TRIAC.
- 8) Switch off the V1 supply. Increase V2 slowly, note down I. Now reduce the voltage between MT2 & MT1 by changing V2.

9) In order to operate the **TRIAC in third quadrant**, reverse the polarity of V_2 power supply with gate -ve bias. (**Make Two more observation tables for TRIAC operating in 3rd Quadrant**)

10) Plot the graph.

CIRCUIT DIAGRAM :



OBSERVATION TABLE:

A. Forward Blocking State / OFF state:

Supply Voltage	$I_g=0$	
V_2 (V)	$V_{(MT2-MT1)}$ (V)	I (mA)
0		
5		
10		
.		
.		
60		

B. Forward Conducting State / ON State:

Supply Voltage	$I_g = \underline{\hspace{2cm}} \text{ mA}$	
$V_2 \text{ (V)}$	$V_{(MT2-MT1)} \text{ (V)}$	$I \text{ (mA)}$
60		
65		
70		
.		
.		
90		

Gate Triggering Voltage = volts

Gate Triggering current = mA

Latching Current = mA

TRIAC Ratings :

Get the info from TRIAC BT136 Datasheet

CONCLUSION:

APPLICATIONS: